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SUBJECT: MATH, SCIENCE AND TECHNOLOGY EDUCATION REMAINS A SERIOUS CONCERN IN SOUTH AFRICA

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Summary

¶1. (U) Inadequate math, science and technology (MST) education remains a serious problem in South Africa. The Department of Education (DOE) and non-government education experts agree that there are multiple causes for the lack of MST skills, including under-qualified teachers, minimal resources, and insufficient student English language proficiency and comprehension. The South African government (SAG), academia, private companies, and NGOs have established programs and projects to increase MST capacity. DOE introduced focused, MST-teaching schools and MST matric (grade twelve) results are slowly rising, but the number of MST university-level students remains low. DOE can prevent the loss of good teachers to overseas employment by improving remuneration packages, working conditions, and training resources for teachers. End Summary

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Improving MST Education - a National Strategy

¶2. (SBU) DOE officials Morongwa Masemola and Thomas Masango told EST FSN that the DOE developed a National Strategy for Mathematics, Science and Technology Education (NSMSTE) in 2001. The strategy was designed to improve MST education through teacher and student education in performance-enhancing programs. DOE initiated accredited, teacher- development programs such as the Advanced Certificate in Education (ACE), the National Professional Diploma in Education (NPDE) in 2002. Over 1,000 MST teachers have been trained to enhance their MST teaching skills. DOE officials state that math enrollment has increased by 4.8 percent and science enrollment has increased by 11.4 percent at dedicated schools between 2001 and ¶2002. They added that the student aggregate math pass rate improved by 26.7 percent and the science pass rate rose by 33.7 percent between 2001 and 2004.

¶3. (U) The Cabinet announced a priority list for MST education in ¶2004. This included setting performance targets for all schools, placing a qualified MST teacher in every classroom and increasing talent identification and enhancement capacity. The Cabinet also encouraged establishing interactive digital content on MST through satellite, TV, Internet, print and multimedia educational portals. The SAG allocated over R92.1 billion ($11.8 billion) to education in 2006, nearly 18 percent of its total spending.

Improving the MST Subject Content - Revising the National Curriculum Statement
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¶4. (U) DOE formulated the National Curriculum Statement (NCS), which was designed to bring change to the content of MST education in ¶2008. The new curriculum is an improvement on the older curriculum, which was an outcome based education system introduced in 2001 to improve teacher and learner skills to meet MST demands of the 21st century. The revised curriculum simplifies teaching language, aligns curriculum with assessment, improves teacher training, provides student support materials and describes the achievement levels expected in a student at the end of grades one to nine. Grades ten to twelve must now take math or math literacy. Note: Math Literary involves teaching math through the application of math knowledge to everyday tasks, rather than complex math concepts. End Note. DOE officials said a revised NCS, effective 2008, phased QEnd Note. DOE officials said a revised NCS, effective 2008, phased out the standard and higher grades learning systems, which encouraged most students to learn MST at the lower standard grade, as opposed to higher grade level, because it seemed relatively easier. Learning MST at the standard grade level produced matric students who could not qualify for entrance to universities.

Some Teachers Struggle

¶5. (U) The NCS requires provinces to conduct workshops for teachers and accredit the teachers. The DOE provides short-term grants to develop and maintain collaboration among teachers, with qualified MST teachers acting as mentors. DOE officials acknowledged that some teachers, especially those with a two-year junior college diploma, were uncomfortable with the new curriculum because they believed that it contained first-year university material, which was above their level of training. Teachers also complained that the government did not provide adequate preparation to implement and teach such a complex program.

Dinaledi Focus Schools

¶6. (U) DOE established focus schools known as Dinaledi (Stars) schools to improve MST enrollment and performance in grade twelve in historically disadvantaged schools. Schools chosen by DOE to become Dinaledi schools were institutions with good academic performance, but were under-resourced. DOE officials reasoned that these schools had the best potential for improved MST participation and performance. The Cabinet-approved program started with 102 schools in 2001, and increased to 488 in 2007, and now includes some private schools. Dinaledi schools are funded by a special government budget, and by private sponsors. National and provincial coordinators work to accelerate implementation and delivery at provincial and local levels.

Department of Science and Technology Involvement

¶7. (SBU) Department of Science and Technology (DST) Science and Youth Programs (SYP) Deputy Director Koki Selepe reported that DST launched the SYP Initiative to provide support to MST education in schools and higher education institutions in all the provinces. Selepe said SYP activities include establishing science centers, identifying talented students, and encouraging science Olympiads, competitions and science camps. SYP targets high school and undergraduate students, as well as students who have left school. Selepe noted that DST also conducts workshops for teachers and students during school holidays, and provides curriculum support to teachers. DST intends to establish science centers throughout the country. Selepe conceded that SYP's success rate is not yet determined. She explained that DST commissioned the Human Sciences Research Council in 2008 to evaluate and monitor the progress of the various camps and learning centers.

¶8. (U) DST supported over 150 lecturers from higher education institutions and over 1,300 school educators between 2005 and 2007. The DST has employed 125 unemployed science graduates, who function as project managers. The graduates are trained through "UMBUSOBOMVU", a government-sponsored youth development fund. Trained students are then placed throughout the country as support staff for teachers. Partners in the SYP projects include the South African Association for Science and Technology Advancement, South African Mathematics Foundation, South Africa Mathematics Society, and the South African Institute of Chartered Accountants. DST has adopted 18 Dinaledi schools, two in each of the nine provinces.

Multiple Challenges at Grassroots Level

¶9. (U) Many South African schools are located in previously disadvantaged areas such as townships, informal settlements, farms and villages, where the majority of the students are black and resources are grossly lacking. EST FSN visited schools in four provinces, all of which cited almost identical problems. School officials state that many MST teachers are under-qualified, usually as a result of being educated under apartheid's two- tiered "Bantu" educational system. The school officials agreed that their schools lacked adequate teaching resources, and that the government chronically delivered the textbooks late. Laboratories are poorly Qchronically delivered the textbooks late. Laboratories are poorly equipped; and libraries lack good books and Internet connections. Classes are large and overcrowded, with a teacher-student ratio averaging between 1 to 35 and 1 to 50. The School officials also observed that many students lack knowledge of basic math, which forces teachers to spend too much time teaching basic math. (Comment. The Public Affairs Section at the U.S. Consulate in Johannesburg notes that these challenges are compounded in urban township schools by the relative ease with which members of the emerging middle class can place their children in schools outside townships. The remaining students come from families lacking the resources to transport their children to better-resourced schools. Indeed, at several schools with which the Public Affairs Section has run programs, children from child-led households make up a majority of the students. End Comment).

¶10. (U) Teachers also expressed concern that students often made poor subject choices, or did not choose subjects according to their strengths and capabilities. Teachers attributed this problem to a lack of parental guidance, a problem intensified by either the parents' long absences or low educational levels. Teachers noted

that many students were not motivated to focus on learning MST because they live alone, or must care for themselves and younger siblings while parents were away. Teachers reported that working parents often came home only once-a-week or even once-a-month in some cases. School officials also commented that many students come from extremely poor families; which forced students to take odd-jobs to earn money for food. As one teacher said, "Their focus is on survival, not school".

Lack of Commitment from Some Educators

¶11. (SBU) University of Pretoria (UP) MST lecturer Ubbo Smith told EST FSN that UP conducts MST teachers' training programs for Mpumalanga provincial teachers, but not all teachers were equally committed to the programs. Smith commented that the teachers traveled far, using public transport to arrive on time at UP, but they tended to give up halfway through the courses. He noted that the number of participants decreased each week as the course progresses. Smith lamented that the "pass one, pass all" approach also undermined the level commitment since all enrolled teachers receive a "pass," despite minimal attendance or performance. He opined that most black teachers' training colleges and universities were institutions of political activity during the apartheid era,

and many teachers still regard themselves as victims of apartheid, and do not accept responsibility for the current lack of MST skills in the country. Smith emphasized that DOE must enact stricter policies if it wanted teachers to attain the wanted skills. He also noted that scarce resources are spread so thinly, that there were no funds to support teacher training programs, and that there were few people to teach those programs. (Comment. The Public Affairs Section at the U.S. Consulate in Johannesburg notes that at many schools in disadvantaged areas, teacher absenteeism outpaces student absenteeism. End Comment.)

Language Remains a Barrier

¶12. (SBU) Marang Center for Math and Science Education (WITS University) Professor Mamokgethi Setati emphasized that teaching math was a specialized skill requiring specialized training. She said, "There is a distinction between teaching math to students, and teaching math-teaching skills to teachers". Setati explained that teacher training must focus on pre-service or in-service training. She emphasized that language is a major barrier, noting that for most learners and teachers in the previously disadvantaged areas, English is a second or third language. Setati noted that some teachers cannot teach math in English because they cannot speak it. She added that some teachers viewed MST as a major challenge for students, and that those teachers focus on less complex math to make math "bearable" for the students. She concluded that DOE intervention programs were inadequate in both quantity and quality and that change had to be brought about at the policy level.

¶13. (U) An Mpumalanga teacher told EST FSN that all subjects from grades one to three were taught in Ndebele. Instruction is conducted in English beginning grade four. The teacher said the curriculum then had to be adjusted to accommodate students with learning difficulties with English, a process made more difficult by Qlearning difficulties with English, a process made more difficult by the large class sizes. The teacher noted that the brighter grade four children forge ahead while the weaker ones struggle to keep up or fall behind entirely.

UNISA and Carnegie Step In

¶14. (U) The University of South Africa (UNISA) established the Institute for Science and Technology Education (ISTE) with the financial assistance of the Carnegie Foundation in 2007. ISTE's main objective is to develop and improve MST teaching capacity, using qualified scientists to train teachers in MST teaching techniques. ISTE head Prof. Harrison Atagana told EST FSN that ISTE currently has 30 students training in ISTE's Masters of Science and PhD programs. ISTE also conducts short courses for MST teachers from outside UNISA.

USAID Intervention

¶15. (U) USAID in Pretoria and Prince George Community College in Maryland sponsored groups of MST teachers, school administrators, and subject advisors that traveled to Maryland between 2003 and

¶2005. The program trained 134 South African teachers in MST. Training focused on improving teaching strategies and methodologies, sharing advanced curriculum development methods, educational management and administration expertise, and sharing knowledge in developing and using outcomes-based-education teacher and learner support materials. A group of South African teachers and education officials traveled to the U.S. to receive training at high schools, community colleges and state education departments. This group gained experience from job-shadowing, on-the-job training, student-teaching type experiences, and attending MST institutes and planned workshops and educational seminars. This program was discontinued due to limited USAID education funding levels.

USAID/South Africa is working with AID/Washington to determine other options for supporting teacher training in MST through the Africa Education Initiative.

USAID Registers Progress

¶16. (SBU) USAID worked with the DOE and the provinces and provided $22.7 million through the Integrated Education Program (IEP) to implement a basic education training program in MST, targeting 30 high schools and 82 primary schools in the Limpopo, KwaZulu-Natal, Eastern Cape, and Northern Cape provinces, beginning in 2004 and ending in 2008. IEP provided short and long-term teacher training support to improve student MST achievement in primary schools, and prepared curriculum to close the MST transition gap between primary and secondary school. Some 24 Limpopo Provincial Education Department and IEP-funded teachers graduated from the University of Limpopo with Bachelor of Education degrees in September 2008. The teachers are qualified to teach high school mathematics, science and technology at an advanced level.

Successful Private Sector Intervention

¶17. (SBU) Edumap College CEO Neville Melville told EST FSN that he decided to conduct his own research after observing the high black student failure rate in university level engineering studies. Melville said his survey showed that students from previously disadvantaged schools had poor communications skills and lacked training in innovative and practical thinking, problem solving and conceptualization. With the financial assistance of private company sponsors, Melville formed Edumap in 1997 to help close these gaps. Edumap is a one-year teaching and training program to upgrade grade twelve scores for students who did not pass their matric. The program provides additional academic tutoring, especially in accounting, math and science to students from financially and socio-economically disadvantaged communities.

¶18. (U) Edumap is also designed to help students gain entry to and succeed at the university. Students are exposed to high levels of MST teaching methods from qualified teachers and instructors. Melville said his students are taught how to handle large amounts of information and to meet time deadlines. They learn business-life and computer skills, time management and a work ethic. Melville said that to date, over 1,200 students have participated in the Edumap College, and that almost all improved their grade twelve scores. He added that former students returned to be sponsors for the new students. According to Melville, his students are better Qthe new students. According to Melville, his students are better positioned to compete for financial support because of their excellent academic scores.

Three-Band Educational System

¶19. (U) South Africa has three bands of education: General Education and Training (GET) grades zero to nine (pre-primary); Further Education and Training (FET) grades ten to twelve (secondary); and Higher Education and Training (HED) (tertiary). The SAG is focused on improving MST at the FET level, arguing that this is the point where students decide whether or not to attend university. MST pass rate results hovered at 40 percent in the late 1990s, and have gradually increased to over 68 percent in 2005.

Comment: an Uncertain Future - But All Is Not Lost

¶20. (U) The SAG has good intentions in attempting to address the complex MST educational problem. However, the SAG needs to coordinate with existing private sector programs since many of them

are more effective than the SAG's and have been operational for much longer. Private sector program administrators would be willing to coordinate with the SAG but only if the SAG would be flexible enough to create a central coordinating body where this can happen, rather than for the SAG to try and impose its program on the existing private sector programs. School principals and teachers could also adopt more proactive attitudes, such as establishing laboratories, collecting books for libraries and seeking extra MST lessons from universities. Finally, the DOE can prevent the loss of good teachers to overseas employment and other domestic professions by improving remuneration packages, working conditions, and training resources for teachers.
LaLime